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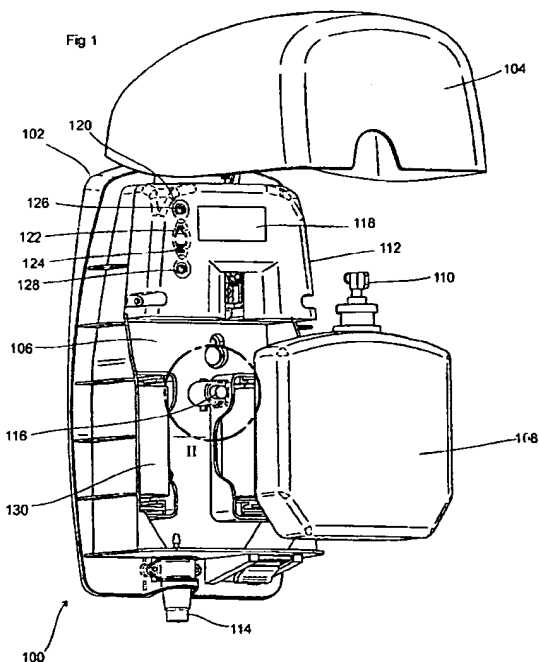**Surrey, RH6 7DQ, United Kingdom**

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B8N NG NHCA

(56) Documents Cited:
GB 2337203 A	GB 2282068 A
US 6267297 B1	US 5449117 A

(58) Field of Search:
UK CL (Edition V) **A5G** GV, **B8N** NHCA NHCC NHCE
NHCZ, **B8T** TFES TWB
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Other: **ONLINE: EPODOC, JPAIO, WPI**

(54) Abstract Title: **Programmable dispenser**

(57) A dispensing apparatus 100 comprises a housing in which is provided a recess for receiving a container 108 of material to be dispensed, and a controller for monitoring and/or controlling the apparatus function; wherein a reset switch 116 is provided, comprising a switch actuator normally extending into the recess such that insertion of a container 108 into the recess depresses the switch 116, the controller thereby being reset on replacement of the container 108. This prevents in the dispenser remaining in a dormant state in which no dispensing takes place or the dispenser continues to function outside programmed parameters without reference to refill status. Through the present invention, the unit is automatically reset when a refill is replaced. The reset can take place either on release of the switch or on depression of the switch. These correspond to removal of the old refill, and insertion of the new refill. The switch can be operated directly by the refill, i.e. by the refill itself acting on the switch, or indirectly by the refill acting on an intermediate member which itself causes operation of the switch.
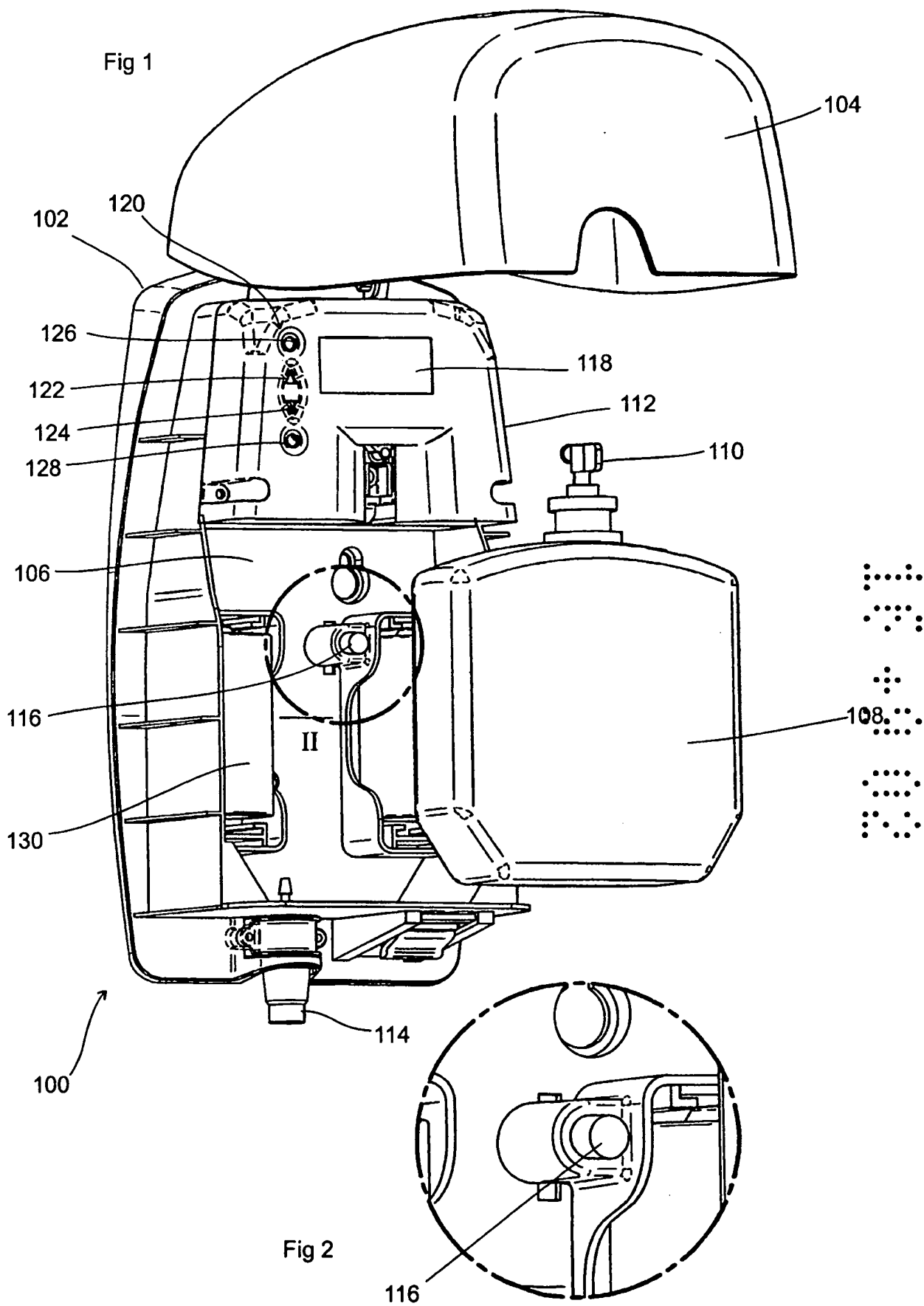
Fig 1

GB 2 392 439 A

Fig 1

Fig 2

Fig 3

204

218

226
222
224
228

202

212

210

216

208

IV

206

200

230

Fig 4

216

208

Fig 5a

Run Screen

300

306

302

304

NEXT SPRAY
9:30

---

1. number of refills per year

9

ADJUST OPTIONS
12,11,10,9,8,7,6
● ENTER

---

2. running 12 or 24 hours

24

ADJUST OPTIONS
24 / 12
● ENTER

12hr selected
go to
function 3

24 Hour
selected

To Fig 5b

---

3. set hours

8:00

ADJUST OPTIONS
12PM - 11PM
12AM - 11AM
● ENTER

---

set 10 mins

8:50

ADJUST OPTIONS
0,1,2,3,4,5
● ENTER

---

set mins

8:59

ADJUST OPTIONS
0,1,2,3,4,5,6,7,8,9
● ENTER

---

4. set start time

7:00

ADJUST OPTIONS
12,1,2,3,4,5,6,7,8,9,10,11, AM
12,1,2,3,4,5,6,7,8,9,10,11 PM
● ENTER

8:30

ADJUST OPTIONS
00,10,20,30,40,50
● ENTER

Go to
function 5

Press START button to initiate programme

From Fig 5a

5. days of operation

DAY
7
ADJUST OPTIONS
7,6,5
ENTER

7 Days selected

6 or 5 days selected go to function 6

6. set current day

TODAY
MO
ADJUST OPTIONS
MO,TU,WE,TH,FR,SA,SU
ENTER

7. 6 days selected

DAY OFF
SU
ADJUST OPTIONS
SU,MO,TU,WE,TH,FR,SA
ENTER

7. 5 days selected

DAY OFF
SA SU
1 2
ADJUST OPTIONS
SA,SU,MO,TU,WE,TH,FR
ENTER

7. 5 days selected

DAY OFF
SA SU
1 2
ADJUST OPTIONS
SU,MO,TU,WE,TH,FR
ENTER

DAY OFF
SA SU
1 2
ENTER

1ST day selected delete from options

Go to function 8

8. intensity plus event

I.P.E
3
ADJUST OPTIONS
0,3,2,1
ENTER

1,2 or 3 selected go to function 9 via function 3 if real time not already programmed

9. select times for intensity plus event 1

I.P.E
1
8:00
ADJUST OPTIONS
12,1,2,3,4,5,6,7,8,9,10,11, AM
12,1,2,3,4,5,6,7,8,9,10,11 PM
ENTER

I.P.E
1
8:20
ADJUST OPTIONS
00,10,20,30,40,50
ENTER

9. select times for intensity plus event 2

I.P.E
2
12:00
ADJUST OPTIONS
12,1,2,3,4,5,6,7,8,9,10,11, AM
12,1,2,3,4,5,6,7,8,9,10,11 PM
ENTER

I.P.E
2
12:20
ADJUST OPTIONS
00,10,20,30,40,50
ENTER

9. select times for intensity plus event 3

I.P.E
3
4:00
ADJUST OPTIONS
12,1,2,3,4,5,6,7,8,9,10,11, AM
12,1,2,3,4,5,6,7,8,9,10,11 PM
ENTER

I.P.E
3
4:20
ADJUST OPTIONS
00,10,20,30,40,50
ENTER

Go to function 10

Zero I.P.E selected

10. select alarm on/off
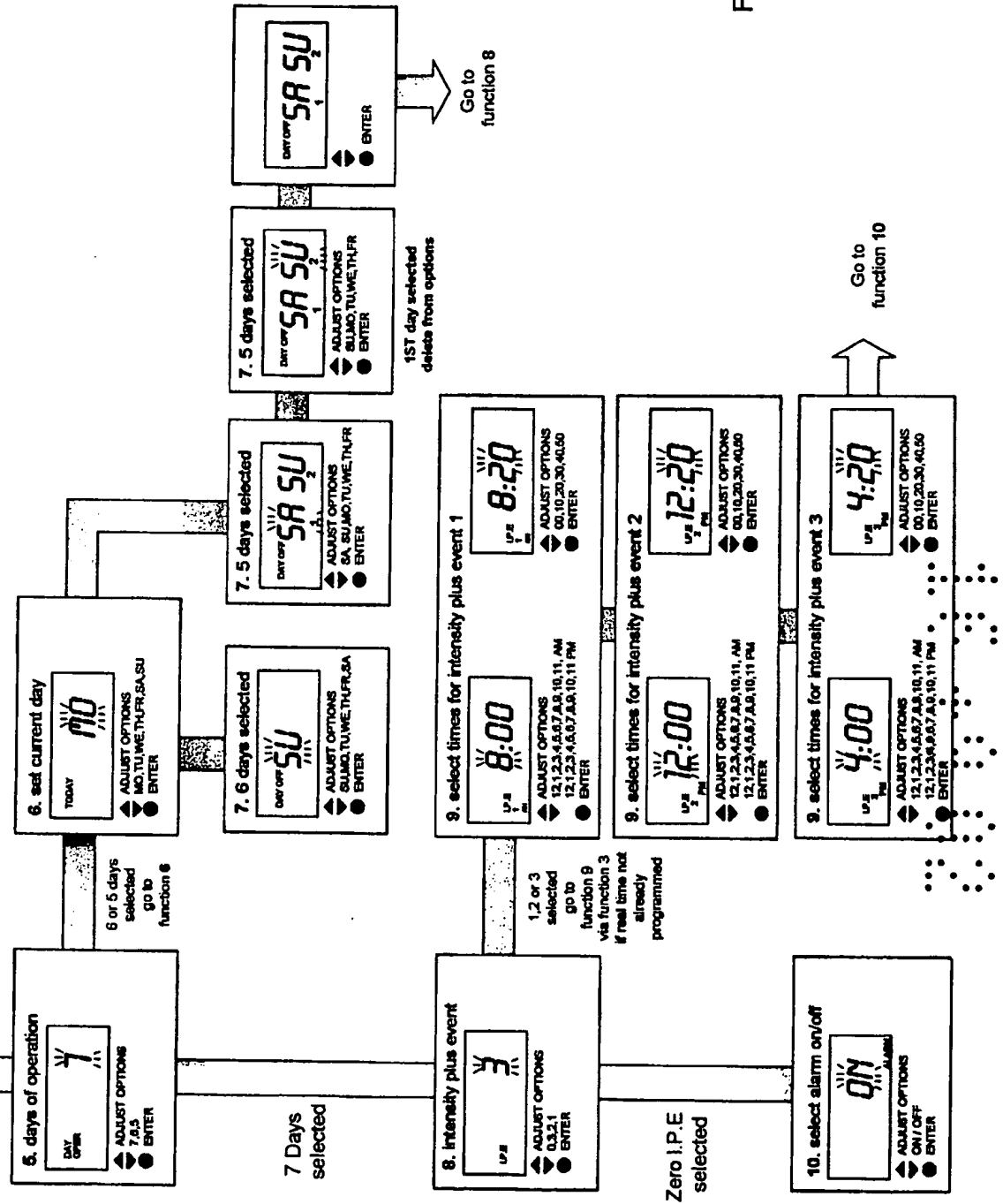
ALARM
ON
ADJUST OPTIONS
ON / OFF
ENTER

Fig 5b

Dispenser

FIELD OF THE INVENTION

The present invention relates to a dispenser. This can be used to dispense a variety of materials, such as (but not limited to) air freshening compositions or other chemicals requiring automatic dosing.

BACKGROUND ART

In the past, various solid materials were utilized which sublimated, thereby dispersing a substitute odour for the odour found in public facilities. In order to enhance the dispersion of such sublimating materials, many suppliers developed powered fan devices which assisted in the dispersal of the sublimated material. Such devices are well known in the art, and an example is shown in US-A-4,830,791 entitled "Odor Control Device", which discloses a solid dispensing device.

Also, odour control devices where a pressurized aerosol container is utilized are well known in the art. Aerosol-type dispensing devices typically include a battery-powered motor that actuates the nozzle on the aerosol container on a periodic basis. These conventional dispensing devices have significant disadvantages. For example, these devices did not inform the user of
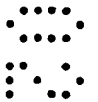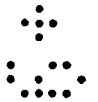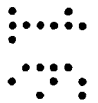
the amount of time or the number of days remaining until the container is replaced or refilled. Efforts were made to resolve these problems, as for example shown in US-A-6394310 which describes a system and a method for programmably dispensing material.

Those existing programmable dispensers which monitor the remaining amount of material do so by inference, subtracting the amount from the amount so far dispensed from a known amount present in a standard refill. These systems adjust the dispensing rate to provide a desired longevity. When the material is exhausted, the dispenser provides a visual and/or audible signal that the refill needs to be replaced. At this point, some dispensers cease to function in all respects other than retention of the memory and provision of the alert. This conserves battery power in those dispensers which are so powered.

Thus, they need to know when a refill has been inserted. A reset button is usually provided for this purpose, for manual actuation by an operator.

SUMMARY OF THE INVENTION

The present invention therefore provides a dispensing apparatus comprising a housing in which is provided a recess for receiving a container of material to be dispensed, and a controller for monitoring and/or controlling the apparatus function;

wherein a reset switch is provided, comprising a switch actuator normally extending into the recess such that insertion of a container into the recess depresses the switch,

the controller thereby being reset on replacement of the container.

We have found that operators often omit to actuate the reset button of known dispensers. This results in the dispenser remaining in a dormant state in which no dispensing takes place, or the dispenser continues to function outside programmed parameters without reference to refill status. This is a clearly unacceptable state. Through the present invention, the unit is automatically reset when a refill is replaced.

3

The reset can take place either on release of the switch or on depression of the switch. These correspond to removal of the old refill, and insertion of the new refill.

The switch can be operated directly by the refill, i.e. by the refill itself acting on the switch, or indirectly by the refill acting on an intermediate member which itself causes operation of the switch.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying figures, in which;

Figure 1 shows a perspective view of a first embodiment of the dispenser of the present invention, with a cover in an open position;

Figure 2 shows an enlarged view of the region marked II on Figure 1;

Figure 3 shows a like perspective view of the dispenser according to a second embodiment of the present invention;

Figure 4 shows an enlarged view of the area marked IV on Figure 3;

Figure 5a shows the first part of a flow chart showing the programming of a dispenser according to present invention; and

Figure 5b shows the second part of the flow chart of Figure 5a.

DETAILED DESCRIPTION OF THE EMBODIMENTS

Referring to Figure 1, a first embodiment of the present invention is shown. In this embodiment, the dispenser is generally identified as 100. This comprises a base 102. A cover 104 is hinged at its upper edge and that of the base 102 so that it may be raised up to allow access to the interior space beneath the cover. That interior space includes in its lower region a cavity 106 sized to receive a container 108 for material to be dispensed. This container 108 may be a pressurized aerosol-type container in which the depression of a nozzle
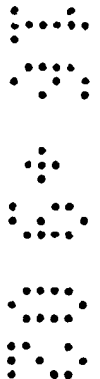
attached to the container causes a predetermined amount to be dispensed, or can be a liquid pump-type container, or any other container suitable for holding material to be dispensed.

The other part of the interior space beneath the lid 104 is a control and actuation apparatus 112 which contains the necessary electronics, motors, gears etc. for operating a hammer and cam mechanism (not shown) which acts upon the nozzle 110 when the container 108 is present in the cavity 106, to cause material to be dispensed.

In this embodiment, the nozzle 110 connects to a suitable conduit (not shown) which passes through the base plate 102 and connects to an outlet 114. A conduit can then be attached to that outlet 114 to provide fluid communication with a unit to which the dispensed material is to be provided, such as the clean water supply to a urinal.

The nozzle can of course be a part of the dispenser, in which case the refill will typically include a suitable connector and/or valve to link to the nozzle or a conduit leading thereto.

A reset button 116 is provided on the back wall of the base plate 102, projecting into the recess 106. When the container 108 is in place within the recess, the reset button 116 is depressed. Upon removal of the container 108, the reset button 116 is released. On re-insertion of a fresh container 108, the reset button 116 is again depressed. Thus, the process of replacing the (presumably exhausted) container 108 with a (presumably full) new container 108' will cause the reset button 116 to be recycled. This can be detected by the control apparatus 112 and used to reset the programming cycle to that based on a new container.

In this embodiment, the refill acts directly on the switch mechanism. An equivalent effect could of course be achieved if the refill acted on an intermediate member or members which themselves acted on the switch.
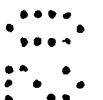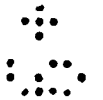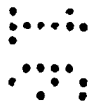
As shown in Figures 1 and 2, the reset button 116 is positioned approximately at the mid point of the recess 106. In this example, the container 108 designed to fit within that recess has a flat rear surface (not visible) which can therefore easily bear against the reset switch 116. However, the precise location of the reset switch 116 is not essential. It can be varied as dictated by the available space in the recess 106 and the specific design of the container 108.

The control apparatus 112 includes an LCD or other similar display 118 and control buttons generally designated as 120. These include an "up" button 122, a "down" button 124, an "enter" button 126 and a "start" button 128. The use of these buttons and the LCD screen 118 to programme the unit will be described later. The control unit 112 further includes a micro processor and associated electronics to control a motor which drives the hammer and cam mechanism, if necessary through suitable gearing.

A pair of recesses 130 are formed in the backplate 102 to receive batteries for providing power to the control unit 112. These are located within the recess 106 behind the intended location of the refill 108. Power could alternatively be provided by a mains connection and transformer.

Figures 3 and 4 show a second embodiment of the present invention. The unit 200 again comprises a back plate 202 and a hinged cover 204 which can be raised to reveal the interior. An interior recess 206 is adapted to receive a container 208 with a nozzle 210. In this case, the container 208 is an aerosol-type container in which the nozzle 210 points outwardly and can release material via an aperture (not visible) in the cover 204. Thus, a hammer and cam mechanism within the control apparatus 212 can act on the nozzle 210 to eject material into the atmosphere around the unit 200.

A reset button 216 is again provided, projecting into the interior of the recess 206. In this case, the container 208 is cylindrical, being an aerosol, and the recess button 216 is adapted to be depressed by the rear of the valve cup rim. Other parts of the container could of course be used to bear on the rest
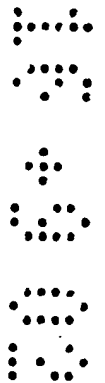
switch. As the nozzle 210 is an integral part of the container, the reset switch 216 is effectively operated by the container 208. Otherwise, the operation of the device corresponds to that of the first embodiment.

In the same manner as the first embodiment, the control apparatus 212 includes an LCD screen 218 and buttons 220 including up and down buttons 222 and 224, an enter button 226 and a start button 228.

A pair of batteries 230 are included in a further recess formed on the back plate 202. These supply power to the control unit 212. Power could alternatively be provided via a suitable mains power connection and transformer.

Figures 5a and 5b show the programming steps adopted according to the present invention. These programming steps can be applied to either the first embodiment of Figures 1 and 2, or the second embodiment of Figures 3 and 4, or to any other embodiment of the present invention. Likewise, not all of the programming steps are essential to operation of the present invention, but all are set out herein for clarity and completeness. Some features of the dispenser and the programming steps are also described and claimed in co-pending applications filed by us.

Whilst the device is running, the LCD display 118 or 218 has the layout generally shown at box 300. This includes a central time display 302 indicating the time remaining until the next dispensing event, labelled "next spray". In addition, multi-segment displays on the left and right hand side show the battery level 304 and the remaining material amount 306 respectively. As the material is dispensed or as the batteries are exhausted, segments are extinguished so that the level shown in the display 300 reduces. When on the last remaining segment, the display flashes to warn the operator that replacement of the batteries or the refill is required imminently.

When the refill container is exhausted, a warning signal is thus given out. This can be backed up with an audible signal if desired. When the refill is completely exhausted, the dispenser can, if desired, cease to function in order to conserve battery power (where applicable). Such a cessation should be in all
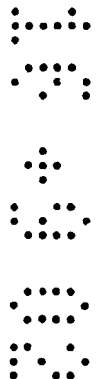
respects other than retention of the memory and the provision of the alert, although this is not essential. On replacement of the refill, the device must then be reset and as described herein this is by way of the reset buttons 116 or 216 which are operated by removal and replacement of the refill.

When the unit is to be programmed, for example on initial installation, after complete loss of power or if a new program is required, the start button 128 or 228 is depressed to initiate the programming sequence. The first step shown in box 1 is the number of refills per year. A default option is preferably indicated, in this case 9, which can then be adjusted using the up and down arrows 122, 124 or 222, 224. When the desired number of refills per year is shown in the display, the enter button 126 or 226 is depressed.

The display then moves on to box 2. In this box, the user must choose between 12 hour operation or 24 hour operation. In 24 hour operation, the device operates continuously throughout the day and night. In 12 hour operation, the device does not do so but operates for a 12 hour period which can be chosen. Again, a default setting is shown in the display, in this case 24 hours. If the user presses the enter button then the programming sequence moves on to the next option at box 5. If the user adjusts the display using the up or down keys to show a 12 hour setting then the sequence moves to box 3 in which the present time is set. Clearly, if the device is running continuously on a 24 hour basis then the precise current time is not relevant to the device and need not be set. Thus, in box 3 the user sequentially sets the hours, tens of minutes and minutes using the up and down keys and the enter key. Other methods of setting the current time could of course be employed, but this method is both speedy and economical as regards the provision of operating buttons. Having set the current time, the programming sequence then moves to box 4 at which the start time for the 12 hour period is set in the same way. In this device, the start time is accurate to within 10 minutes and therefore there is no need to set the precise number of minutes. However, this could be provided if preferred, although it is usually unnecessary. No stop time is programmed in this embodiment, as this is assumed to be 12 hours after the time. However, if desired a stop time could be set in which case the device would not operate for
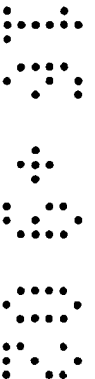
12 hours but would operate in the interval between the start and stop time. 12 hour operation would thus indicate "n" hour operation, where n is less than 24.

The programming sequence then moves on to box 5. In this step, the number of days of operation is chosen. The device can obviously operate either for 7 days per week, or for fewer days. In this option, it is possible to set the number of days for operation for either 5, 6 or 7 although other numbers such as 1, 2, 3 or 4 could be provided. If 7 days are selected then there is obviously no need to set the current day and the programming sequence moves immediately to the next general step. If 5 or 6 (or fewer) days are selected then the programming sequence moves to box 6 in which the current day of the week is selected. A default indication of "MO" for Monday is shown, the user must adjust this using the up and down keys to show the current day of the week. When this is done, the enter key is selected. The sequence then moves to box 7 in which the days of non-operation are selected. Selection of non-operating days is easier as if 5 or 6 day operation is chosen then there will be fewer non-operating days than operating days. The programming sequence could require the user to select the operating days instead, but this will be typically be lengthy for most users. Alternatively, the programming sequence could require the selection of operating days (as opposed to non-operating days) if 3 or fewer days of operation are selected, if this option is available. In box 7, the user is required to select the required non-operating days, which will usually be Saturday and Sunday. Once both are selected, or if 7 day operation was selected, the sequence then moves to box 8.
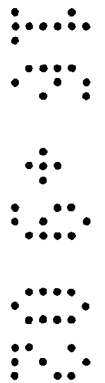
It will thus be appreciated that the operation of the device can either be continuous, 24 hours a day, 7 days a week, or can be set to any lesser operating sequence. The operating sequence can be limited by the time of the day or by the particular days of the week. Thus, for example, in a public convenience such as a Railway Station or Airport in a busy city location it may be desirable for the device to operate continuously. In an office environment, it may be preferable to operate between the hours of 7am and 7pm for the working week of Monday to Friday. In a retail environment, 12 hour operation over a 6 day week may be

preferred in those jurisdictions where 7 day opening of retail establishments is not permitted.

At box 8, the user can programme "intensity plus" events, to cater for regular times of increased activity. These are events during which normal dosing is suspended and the unit doses 3 times at 2 minute intervals. Thus, each such event has a duration of 4 minutes. At the end of the intensity plus event, normal dosage resumes from the point at which it was suspended. Thus, if the normal dosage frequency is every 15 minutes and an intensity plus event occurs at (say) 10:05 and thus ends at 10:09, the normal dosage that would have been due at 10:15 would in fact take place at 10:19. Other arrangements for the intensity plus event could of course be provided, such as the normal dose frequency occurring in the background in parallel to the intensity plus events and unaffected thereby. Likewise, different dosing intervals and durations could be adopted for the intensity plus events. However, the principle remains the same.

Thus, in box 8 the user can select the desired number of intensity plus events during each working day. Possible options in the embodiment shown are 0, 1, 2 and 3 although larger numbers such as 4, 5, 6 or more could be provided. If the user selects no intensity plus events then programming sequence moves to the final step (box 10), described later. If 1, 2 or 3 intensity plus events are selected then the device checks to see whether the current time of day was set in box 3; if not then box 3 is visited so that the time of day can be set to enable the time of the intensity plus events to be determined. Once the time has been set, or if the time has already set, the programming sequence moves to box 9. At this point, the user can set the start time for the first (or only) intensity plus event. This is set to an accuracy of 10 minutes using the up, down and enter buttons as before. This is then repeated as necessary to set the optional second and third intensity plus events. When all intensity plus events are set then the programming sequence moves to the final box 10 in which the alarm is activated or deactivated using the up and down keys followed by the enter key when the user is content of the displayed option. If the alarm is set to be on then an audible alarm is emitted when the dispensing container 108 or 208 is empty. No such alarm is made if the alarm is deactivated. Once the

alarm is set, the programming sequence is complete and the device returns to the run screen 300 and the device begins operation.

Thus, once all the desired settings are made, the control unit 112 or 212 can calculate the necessary dosing frequency. From the number of refills desired per annum, the unit can calculate the intended life of each refill by dividing that number into 365 days or one year. With the life of the refill thus known, the unit then subtracts the material required for the intensity plus events during that time from the amount of material in one refill. The remaining material can then be divided into the total dispensing time, ie 24 or 12 times n/7 times the required life in days, according to whether 24 or 12 hour operation is chosen, where n is the number of operating days per week. This yields a time between dispensing events.

The unit timer can then operate the hammer and cam at the appropriate intervals to dispense material as required by the program.

It should be noted that other mathematical formulae could be adopted, of either greater or lesser accuracy. For example, the above-described formula does not take account of the time spent during intensity plus events, during which normal dosing is suspended. Thus, the total dosing time calculated by this formula is slightly greater than actually required and this will result in a slight excess of material when the refill is deemed to be exhausted. Likewise, the n/7 calculation introduces a slight inaccuracy in that if the life of a refill starts or ends midweek then the total number of operating days will not be exactly 5/7ths (say) of the total life. However, these errors may in practice be small and the cost of the unused material would need to be compared to the additional work in coding and running a more accurate formula.

It will of course be appreciated that the above description is by way of example only and that many variations may be made without departing from the present invention.
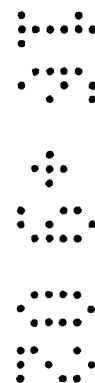
CLAIMS

1. A dispensing apparatus comprising a housing in which is provided a recess for receiving a container of material to be dispensed, and a controller for monitoring and/or controlling the apparatus function;

wherein a reset switch is provided, comprising a switch actuator normally extending into the recess such that insertion of a container into the recess depresses the switch,

the controller thereby being reset on replacement of the container.

2. A dispensing apparatus according to claim 1 in which the reset takes place on release of the switch.

3. A dispensing apparatus according to claim 1 in which the reset takes place on depression of the switch.

4. A dispensing apparatus according to any one of the preceding claims in which the switch is operated directly by the refill.

5. A dispensing apparatus according to any one of claims 1 to 3 in which the switch is operated by the refill acting on an intermediate member which itself causes operation of the switch.

6. A dispensing apparatus according to any one of the preceding claims in which the reset switch is a push-button device.

7. A dispensing apparatus substantially as any one herein described with reference to and/or as illustrated in the accompanying figures.
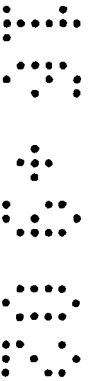
Application No:	GB 0220173.9	*12* **Examiner:**	Darren Williams
Claims searched:	1-7	**Date of search:**	28 January 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
X	1-6	GB 2337203 A	(DUDLEY INDUSTRIES) see whole document, especially fig 1 and page 6 of the description
X	1-6	GB 2282068 A	(DUDLEY INDUSTRIES) see lines 15 to 17 of page 5
X	1-6	US 5449117	(MUDERLAK) see whole document, especially fig 3
A		US 6267297 B1	(CONTADINI)

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^V:

A5G, B8N, B8T

Worldwide search of patent documents classified in the following areas of the IPC^7:

A61L, B67D

The following online and other databases have been used in the preparation of this search report:

EPODOC, WPI, JAPIO